**Unit Title**

Extreme Ecosystems

**Grade Level**

9th-10th grade

**Course**

General Biology

**Duration**

18 days

**Overview**

This unit uses the study of “extreme” ecosystems to teach concepts of ecology. The unit will take place in the spring after students have studied genetics and evolution. The concepts that will be covered are; Interdependent relationships in ecosystems, cycles of matter and energy transfer in ecosystems, and ecosystem dynamics, functioning and resilience.

**Description**

The unit will begin with an introduction to the concept of biomes and equilibrium within a system. The introduction will include an ecosystem lab. The first extreme ecosystem will be the polar system. This is a photosynthetic based system and will allow discussion of carbon cycling and include an appropriate lab. Biodiversity will also be addressed, as well as human impact and global warming. Next, students will study the rainforest and focus on food webs and the passage of energy. We will move to the ocean next to learn the effects of ocean acidification. Our chemistry teacher will review acids and bases, pH and the effects of ocean acidification. We will then move to the deep ocean to discuss adaptation, interdependent relationships, and finally, the discussion of a chemosynthetic based food web; the hydrothermal vents system. The unit will be summarized with a culminating activity to reinforce all of the concepts and allow students to explore cause and effect within the chemical cycles in an ecosystem of their choosing, creating connections to food webs as well as human impact.

**Purpose of the Unit**

The purpose of this unit is to give students a view of the world on a macroscopic scale. The previous units in this course focus heavily on the microscopic facets of life. This unit is a segue into a discussion of the topics in general biology that can be seen with the naked eye. By using extreme ecosystems as a context for teaching concepts in ecology, students will hopefully gain a deeper understanding of the world around them by recognizing that all things in life are ultimately interconnected in an intricate manner.

**Rationale for Unit**

This topic is meaningful for students because it addresses topics that are visible in the world around them. Ecology is a very tangible topic to teach because one can find examples of these topics by looking out a window. Inquiry is a very important part of this unit, just as it is in all units in science. By both asking questions and encouraging students to formulate their own, students will learn how to ask questions about the world around them in their everyday lives. Students' prior experience and knowledge was taken into account through the use of "hooks" at the beginnings of the lessons. Using these attention-grabbing devices, one can determine what students already have a basic understanding of, what they already know very well, and what they are lacking in background knowledge. The lessons in this unit are sequenced in a manner that transitions between different extreme ecosystems that are relevant to the sequence of ecology topics. Each lesson builds on the previous one. Students will be able to make sense of the material through the variety of activities that have been planned. There is very minimal time spent lecturing in this unit. The majority of the lessons involve activities that engage students in active inquiry-based learning.

**Links to GSEs**

LS2 (9-11)-3: <http://riscienceteachers.wikispaces.com/LS2+%289-11%29+-3>

LS2 (9-11)-4: <http://riscienceteachers.wikispaces.com/LS2+%289-11%29+-+4>

PS1 (9-11)–1: <http://riscienceteachers.wikispaces.com/PS1+%289-11%29+-+1>

Science practices:

<http://www.nextgenscience.org/sites/ngss/files/Appendix%20F_Science%20%20Engineering%20Practice%20-%20FINAL.pdf>

**Driving Question for Unit**

How does matter cycle through our world and how can we ensure that the equilibrium of each ecosytem is maintained?